CLAIMS

What is claimed is:

1   1.   A method, comprising:

2   establishing a connection between a server and a synchronization client

3   associated with a handheld device, the server having a first database and the

4   handheld device having a second database, the handheld device having an

5   application to allow a user to access the second database, wherein the

6   synchronization client to use the connection in a synchronization operation of the

7   second database and the first database;

8   receiving, from the server, first information indicative of a structure of the first

9   database;

10   receiving, from the server, second information indicative of a version of the

11   application from the server ;

12   sending, to the server, information of transactions performed on the second

13   database by a user via the handheld device;

14   receiving metadata from the server to update the application on the handheld

15   device when the application has been updated since a previous synchronization

16   operation; and

17   receiving, from the server, data extracted from the second database to

18   update the second database.

1   2.   The method of claim 1, further comprising determining whether the structure

2   of the first database has been updated since the previous synchronization

3   operation.

1   3.   The method of claim 2, wherein determining whether the structure of the first

2   database has been updated since the previous synchronization operation,

3   comprises:

4   comparing the first information with information stored on the handheld

5   device that is indicative of the structure of the first database when the previous

6   synchronization operation was performed.

1   4.   The method of claim 2, wherein receiving, from the server, data extracted

2   from the first database to update the second database, comprises:

3   receiving, from the server, a first set of data extracted from the first database

4   when the structure of the first database has been updated since the previous

5   synchronization operation, the first set of data including data that has not changed in

6   the second database since the previous synchronization operation was performed.

1   5.   The method of claim 2, wherein receiving, from the server, data extracted

2   from the first database to update the second database, comprises:

3   receiving, from the server, a second set of data extracted from the first

4   database when the structure of the first database has not been updated since the

5   previous synchronization operation, the second set of data not including data that

6   has not changed in the second database since the previous synchronization

7   operation was performed.

1   6.   The method of claim 1, further comprising determining whether the

2   application has been updated since the previous synchronization operation.

1   7.   The method of claim 6, wherein determining whether the application has

2   been updated since the previous synchronization operation, comprises:

3   comparing the second information with information stored on the handheld

4   device that is indicative of the version of the application when the previous

5   synchronization operation was performed.

1   8.   The method of claim 1, wherein sending, to the server, information of

2   transactions performed on the second database, comprises:

3   receiving, from the server, an identifier of information of a last transaction

4   received by the server; and

5   sending, to the server, transaction information that includes an identifier for

6   each transaction made after the last transaction received by the server.

1   9.   The method of claim 8, wherein sending to the server information of

2   transactions performed on the second database, further comprises:

3   receiving, from the server, error information when the server detects a

4   transaction error;

5   providing an indication of the error information to a user; and

6   receiving input from the user to process the transaction error.

1   10.   The method of claim 1, further comprising sending filter information to the

2   server before receiving data from the server to update the second database, the

3   filter information to be used by the server in providing data to the synchronization

4   client.

1   11.   An system, comprising:

2   means for establishing a connection between a server and a synchronization

3   client associated with a handheld device, the server having a first database and the

4   handheld device having a second database, the handheld device having an

5   application to allow a user to access the second database, wherein the

6   synchronization client to use the connection in a synchronization operation of the

7   second database and the first database;

8   means for receiving, from the server, first information indicative of a structure

9   of the first database;

10   means for receiving, from the server, second information indicative of a

11   version of the application from the server;

12   means for sending, to the server, information of transactions performed on

13   the second database by a user via the handheld device;

14   means for receiving metadata from the server to update the application on

15   the handheld device when the application has been updated since a previous

16   synchronization operation; and

17   means for receiving, from the server, data extracted from the second

18   database to update the second database.

1   12.   The system of claim 11, further comprising means for determining whether

2   the structure of the first database has been updated since the previous

3   synchronization operation.

1   13.   The system of claim 12, wherein the means for determining, comprises:

2   means for comparing the first information with information stored on the

3   handheld device that is indicative of the structure of the first database when the

4   previous synchronization operation was performed.

1   14.   The system of claim 12, wherein the means for receiving, from the server,

2   data extracted from the first database to update the second database, comprises:

3   means for receiving, from the server, a first set of data extracted from the first

4   database when the structure of the first database has been updated since the

5   previous synchronization operation, the first set of data including data that has not

6   changed in the second database since the previous synchronization operation was

7   performed.

1   15.   The system of claim 12, wherein the means for receiving, from the server,

2   data extracted from the first database to update the second database, comprises:

3   means for receiving, from the server, a second set of data extracted from the

4   first database when the structure of the first database has not been updated since

5   the previous synchronization operation, the second set of data not including data

6   that has not changed in the second database since the previous synchronization

7   operation was performed.

1   16.   The system of claim 11, further comprising means for determining whether

2   the application has been updated since the previous synchronization operation.

1   17.   The system of claim 16, wherein the means for determining whether the

2   application has been updated since the previous synchronization operation,

3   comprises:

4   means for comparing the second information with information stored on the

5   handheld device that is indicative of the version of the application when the previous

6   synchronization operation was performed.

1   18.   The system of claim 11, wherein the means for sending to the server

2   information of transactions performed on the second database, comprises:

3   means for receiving, from the server, an identifier of information of a last

4   transaction received by the server; and

5   means for sending, to the server, transaction information that includes an

6   identifier for each transaction made after the last transaction received by the server.

1   19.   The system of claim 18, wherein the means for sending to the server

2   information of transactions performed on the second database, further comprises:

3   means for receiving, from the server, error information when the server

4   detects a transaction error;

5   means for providing an indication of the error information to a user; and

6   means for receiving input from the user to process the transaction error.

1   20.   The system of claim 11, further comprising means for sending filter

2   information to the server before receiving data from the server to update the second

3   database, wherein the filter information to be used by the server in providing data to

4   the synchronization client.

1   21.   A machine-readable medium having stored thereon a plurality of instructions

2   that when executed by a computer cause the computer to perform operations

3   comprising:

4   establishing a connection between a server and a synchronization client, the

5   synchronization client associated with a handheld device, the server having a first

6   database and the synchronization client being associated with a second database,

7 the handheld device having an application to allow a user to access the second

8 database, wherein the synchronization client to use the connection in a

9 synchronization operation of the second database and the first database;

10   receiving, from the server, first information indicative of a structure of the first

11 database;

12   receiving, from the server, second information indicative of a version of the

13 application from the server;

14   sending, to the server, information of transactions performed on the second

15 database by a user via the handheld device;

16   receiving metadata from the server to update the application on the handheld

17 device when the application has been updated since a previous synchronization

18 operation; and

19   receiving, from the server, data extracted from the second database to

20 update the second database.

1 22. The machine-readable medium of claim 21, wherein the plurality of

2 instructions further comprise instructions that when executed by the computer cause

3 the computer to perform operations comprising:

4   determining whether the structure of the first database has been updated

5 since the previous synchronization operation.

1 23. The machine-readable medium of claim 22, wherein the instructions for

2 performing the operation of determining whether the structure of the first database

3 has been updated since the previous synchronization operation, include instructions

4 that when executed by the computer cause the computer to perform operations

5 comprising:

6   comparing the first information with information stored on the handheld

7   device that is indicative of the structure of the first database when the previous

8   synchronization operation was performed.

1   24.   The machine-readable medium of claim 22, wherein the instructions for

2   performing the operation of receiving, from the server, data extracted from the first

3   database to update the second database, include instructions that when executed

4   by the computer cause the computer to perform operations comprising:

5   receiving, from the server, a first set of data extracted from the first database

6   when the structure of the first database has been updated since the previous

7   synchronization operation, the first set of data including data that has not changed in

8   the second database since the previous synchronization operation was performed.

1   25.   The machine-readable medium of claim 22, wherein the instructions for

2   performing the operation of receiving, from the server, data extracted from the first

3   database to update the second database, include instructions that when executed

4   by the computer cause the computer to perform operations comprising:

5   receiving, from the server, a second set of data extracted from the first

6   database when the structure of the first database has not been updated since the

7   previous synchronization operation, the second set of data not including data that

8   has not changed in the second database since the previous synchronization

9   operation was performed.

1   26.   The machine-readable medium of claim 21, wherein the plurality of

2   instructions further comprises instructions that when executed by the computer

3   cause the computer to perform operations comprising:

4   determining whether the application has been updated since the previous

5   synchronization operation.

1   27.   The machine-readable medium of claim 26, wherein the instructions for

2   performing the operation of determining whether the application has been updated

3   since the previous synchronization operation, include instructions that when

4   executed by the computer cause the computer to perform operations comprising:

5   comparing the second information with information stored on the handheld

6   device that is indicative of the version of the application when the previous

7   synchronization operation was performed.

1   28.   The machine-readable medium of claim 21, wherein the instructions for

2   performing the operation of sending, to the server, information of transactions

3   performed on the second database, include instructions that when executed by the

4   computer cause the computer to perform operations comprising:

5   receiving, from the server, an identifier of information of a last transaction

6   received by the server; and

7   sending, to the server, transaction information that includes an identifier for

8   each transaction made after the last transaction received by the server.

1   29.   The machine-readable medium of claim 28, wherein the instructions for

2   sending to the server information of transactions performed on the second

3   database, include instructions that when executed by the computer cause the

4   computer to perform operations comprising:

5   receiving, from the server, error information when the server detects a

6   transaction error;

7   providing an indication of the error information to a user; and

8   receiving input from the user to process the transaction error.

1   30.   The machine-readable medium of claim 21, wherein the plurality of

2   instructions further include instructions that when executed by the computer cause

3   the computer to perform operations comprising:

4   sending filter information to the server before receiving data from the server

5   to update the second database, the filter information to be used by the server in

6   providing data to the synchronization client.

1   31.   A handheld device, comprising:

2   a local database;

3   a user interface coupled to the local database;

4   a transaction recorder coupled to the local database, wherein the transaction

5   recorder to record information related to changes made to the local database by a

6   user of the handheld device via the user interface and to provide the recorded

7   information to a server during a synchronization operation;

8   a metadata importer coupled to the user interface, wherein the metadata

9   importer to receive metadata from the server during the synchronization operation,

10   the metadata including information for updating the user interface; and

11   a data importer coupled to the local database, wherein the data importer to

12   receive data provided by the server during the synchronization operation, the data

13   being extracted from a main database by the server.

1   32.   The handheld device of claim 31, wherein the data importer further to provide

2   updated filter information to the server during the synchronization operation, the

3   filter information used by the server in providing the data.

1   33.   The handheld device of claim 31, wherein the data importer further to

2   determine whether a structure of the main database has been changed since a

3   previous synchronization operation.

1   34.   The handheld device of claim 33, wherein the data importer to receive an

2   identifier corresponding to the structure of the main database and compare the

3   received identifier with a stored identifier corresponding to the structure of the main

4   database when the previous synchronization operation was performed.

1   35.   The handheld device of claim 33, wherein the data importer to receive a first

2   set of data extracted from the main database by the server when the structure of the

3   main database has changed since the previous synchronization operation, the first

4   set of data including data that has not changed in the local database since the

5   previous synchronization operation was performed.

1   36.   The handheld device of claim 33, wherein the data importer to receive a

2   second set of data extracted from the main database by the server when the

3   structure of the main database has not changed since the previous synchronization

4   operation, the second set of data omitting data that has not changed in the local

5   database since the previous synchronization operation was performed.

1   37.   The handheld device of claim 31, wherein the metadata importer to

2   determine whether the user interface has been updated since the previous

3   synchronization operation.

1   38.   The handheld device of claim 37, wherein the metadata importer to receive

2   version information of a most currently available user interface and to compare the

3   received version information with version information corresponding to the user

4   interface included in the handheld device.

1   39.   The handheld device of claim 31, wherein the transaction recorder to receive

2   from the server an identifier of a last transaction recorded by the transaction for

3   which transaction information was received by the server from the handheld device,

4   and to send to the server transaction information that includes an identifier for each

5   transaction made after the last transaction.

1   40.   The handheld device of claim 39, wherein the transaction recorder to receive

2   from the server error information when the server detects a transaction error, to

3   provide an indication of the error information to a user, and to receive input from the

4   user to process the transaction error.

1   41.   A method, comprising:

2   establishing a connection between a server and a synchronization client

3   associated with a handheld device, the server having a first database and the

4   handheld device having a second database, the handheld device having an

5   application to allow a user to access the second database, wherein the

6   synchronization client to use the connection in a synchronization operation of the

7   second database and the first database;

8   receiving first filter information from the server, the first filter information

9   including at least one business object, each business object having an associated

10   set of filters;

11   retrieving second filter information stored on the handheld device, the second

12   filter information including at least one business object, each business object having

13   an associated filter that was active during a previous synchronization operation;

14   processing the first filter and second filter information to select active filters;

15   storing the processed filter information to serve as the second filter

16   information for a next synchronization operation; and

17   sending the processed filter information to the server during the

18   synchronization operation.

1   42.   The method of claim 41, wherein processing the first and second filter

2   information comprises:

3   forming an XML document that includes each business object and its

4   associated active filter.

1   43.   The method of claim 41, wherein processing the first filter and second filter

2   information to select active filters, comprises:

3   for each business object included in the first filter information, selecting a

4   default filter associated with the business object in the first filter information as the

5   business object's active filter;

6   for each business object and associated filter in the second filter information

7   that is also included in the first filter information, selecting the associated filter of the

8   second filter information as the business object's active filter.

1   44.   The method of claim 43, wherein selecting a default filter associated with the

2   business object in the first filter information as the business object's active filter,

3   comprises:

4   forming a linked list of each business object and its associated set of filters;

5   and

6   for each business object of the first filter information, selecting a first found

7   default filter as the business object's active filter.

1   45.   The method of claim 44, wherein selecting the associated filter of the second

2   filter information as the business object's active filter, comprises:

3   for each business object of the second filter information, determining whether

4   the business object and its associated filter in the second filter information is also

5   present in the linked list; and

6   for each business object and associated filter of the second filter information

7   that is present in the linked list, selecting the associated filter of the second filter

8   information as the active filter.

1   46.   A system, comprising: means for establishing a connection between a

2   server and a synchronization client associated with a handheld device, the server

3   having a first database and the handheld device having a second database, the

4   handheld device having an application to allow a user to access the second

5 database, wherein the synchronization client to use the connection in a

6 synchronization operation of the second database and the first database;

7   means for receiving first filter information from the server, the first filter

8 information including at least one business object, each business object having an

9 associated set of filters;

10   means for retrieving second filter information stored on the handheld device,

11 the second filter information including at least one business object, each business

12 object having an associated filter that was active during a previous synchronization

13 operation;

14   means for processing the first filter and second filter information to select

15 active filters;

16   means for storing the processed filter information to serve as the second filter

17 information for a next synchronization operation; and

18   means for sending the processed filter information to the server during the

19 synchronization operation.

1 47. The system of claim 46, wherein the means for processing the first and

2 second filter information comprises:

3   means for forming an XML document that includes each business object and

4 its associated active filter.

1 48. The system of claim 46, wherein the means for processing the first filter and

2 second filter information to select active filters, comprises:

3   means, for each business object included in the first filter information, for

4 selecting a default filter associated with the business object in the first filter

5 information as the business object's active filter;

6   means, for each business object and associated filter in the second filter

7   information that is also included in the first filter information, for selecting the

8   associated filter of the second filter information as the business object's active filter.

1   49.   The system of claim 48, wherein the means for selecting a default filter

2   associated with the business object in the first filter information as the business

3   object's active filter, comprises:

4   means for forming a linked list of each business object and its associated set

5   of filters; and

6   means, for each business object of the first filter information, for selecting a

7   first found default filter as the business object's active filter.

1   50.   The system of claim 49, wherein the means for selecting the associated filter

2   of the second filter information as the business object's active filter, comprises:

3   means, for each business object of the second filter information, for

4   determining whether the business object and its associated filter in the second filter

5   information is also present in the linked list; and

6   means, for each business object and associated filter of the second filter

7   information that is present in the linked list, for selecting the associated filter of the

8   second filter information as the active filter.

1   51.   A machine-readable medium having stored thereon a plurality of instructions

2   that when executed by a computer cause the computer to perform operations

3   include instructions that when executed by the computer cause the computer to

4   perform operations comprising:

5   establishing a connection between a server and a synchronization client

6   associated with a handheld device, the server having a first database and the

7   handheld device having a second database, the handheld device having an

8   application to allow a user to access the second database, wherein the

9   synchronization client to use the connection in a synchronization operation of the

10   second database and the first database;

11   receiving first filter information from the server, the first filter information

12   including at least one business object, each business object having an associated

13   set of filters;

14   retrieving second filter information stored on the handheld device, the second

15   filter information including at least one business object, each business object having

16   an associated filter that was active during a previous synchronization operation;

17   processing the first filter and second filter information to select active filters;

18   storing the processed filter information to serve as the second filter

19   information for a next synchronization operation; and

20   sending the processed filter information to the server during the

21   synchronization operation.

1   52.   The machine-readable medium of claim 51, wherein the instructions for

2   performing the operation of processing the first and second filter information include

3   instructions that when executed by the computer cause the computer to perform

4   operations comprising:

5   forming an XML document that includes each business object and its

6   associated active filter.

1   53.   The machine-readable medium of claim 51, wherein the instructions for

2   performing the operation of processing the first filter and second filter information to

3   select active filters include instructions that when executed by the computer cause

4   the computer to perform operations comprising:

5   for each business object included in the first filter information, selecting a

6   default filter associated with the business object in the first filter information as the

7   business object's active filter; and

8   for each business object and associated filter in the second filter information

9   that is also included in the first filter information, selecting the associated filter of the

10 second filter information as the business object's active filter.

1   54.   The machine-readable medium of claim 53, wherein the instructions for

2   performing the operation of selecting a default filter associated with the business

3   object in the first filter information as the business object's active filter include

4   instructions that when executed by the computer cause the computer to perform

5   operations comprising:

6   forming a linked list of each business object and its associated set of filters;

7   and

8   for each business object of the first filter information, selecting a first found

9   default filter as the business object's active filter.

1   55.   The machine-readable medium of claim 54, wherein the instructions for

2   performing the operation of selecting the associated filter of the second filter

3   information as the business object's active filter include instructions that when

4   executed by the computer cause the computer to perform operations comprising:

5   for each business object of the second filter information, determining whether

6   the business object and its associated filter in the second filter information is also

7   present in the linked list; and

8   for each business object and associated filter of the second filter information

9   that is present in the linked list, selecting the associated filter of the second filter

10   information as the active filter.

1   56.   A handheld device, comprising:

2   a memory;

3   a local database stored in the memory;

4   a user interface coupled to the local database;

5   a transaction recorder coupled to the local database, wherein the transaction

6   recorder to record information related to changes made to the local database by a

7   user of the handheld device via the user interface and to provide the recorded

8   information to a server during a synchronization operation;

9   a data importer coupled to the local database, wherein the data importer to

10   receive data provided by the server during the synchronization operation and to

11   store the data in the local database, the data being extracted from a main database

12   and filtered by the server before being received by the data importer; and

13   a filter processor coupled to the memory, wherein the filter processor to:

14   receive first filter information from the server, the first filter information

15   including at least one business object, each business object having an associated

16   set of filters;

17   retrieve second filter information stored in the memory, the second

18   filter information including at least one business object, each business object having

19   an associated filter that was active during a previous synchronization operation;

20   process the first filter and second filter information to select active

21   filters;

22   store the processed filter information in the memory to serve as the

23   second filter information for a next synchronization operation; and

24   send the processed filter information to the server during the

25   synchronization operation, the processed filter information to be used by the server

26   in filtering the data extracted from the main database.

1   57.   The handheld device of claim 54, wherein the filter processor to form an XML

2   document that includes each business object and its associated active filter.

1   58.   The handheld device of claim 54, wherein in processing the first filter and

2   second filter information to select active filters, the filter processor to:

3   for each business object included in the first filter information, select a default

4   filter associated with the business object in the first filter information as the business

5   object's active filter; and

6   for each business object and associated filter in the second filter information

7   that is also included in the first filter information, select the associated filter of the

8   second filter information as the business object's active filter.

1   59.   The handheld device of claim 58, wherein in selecting a default filter

2   associated with the business object in the first filter information as the business

3   object's active filter, the filter processor to:

4   form a linked list of each business object and its associated set of filters; and

5   for each business object of the first filter information, select a first found

6   default filter as the business object's active filter.

1   60.   The handheld device of claim 59, wherein in selecting the associated filter of

2   the second filter information as the business object's active filter, the filter processor

3   to:

4   for each business object of the second filter information, determine whether

5   the business object and its associated filter in the second filter information is also

6   present in the linked list; and

7   for each business object and associated filter of the second filter information

8   that is present in the linked list, select the associated filter of the second filter

9   information as the active filter.